1859MNRAS..19..222W

be found to occupy a very high place as regards accuracy. The comparisons in the *Greenwich Lunar Reductions* of Plana's theory, based on Damoiseau's and Plana's elliptic constants, with observations, show that it is greatly superior to Burckhardt's.

"Besides the conclusion as to the general accuracy of Hansen's tables, two or three other conclusions will, perhaps, properly follow from this *exposé*.

"1. The policy of the establishment and vigorous employment of the altazimuth at the Royal Observatory is well supported, I conceive, by these results. In almost all cases, the largest errors of Burckhardt's places are obtained in these parts of the moon's orbit which could not be touched by the meridional instrument, and they became the crucial points for any new theory. These errors are faithfully corrected by Hansen's tables.

"2. This comparison generally furnishes a remarkable proof, if any were wanted, of the enormous value of the system of keeping up the reduction of observations to the greatest accuracy that is permitted by existing elements.

"3. So long as observations are confined to the meridional half of the moon's orbit, the variation and the parallactic equation are always combined in the same way; but in that part which is touched only by the altazimuth, they are combined in the opposite way. The equally effective correction in both parts of the orbit exhibited by Hansen's tables proves (among other things) that his parallactic equation must be very correct, and therefore that his assumption as to the sun's distance must be nearly accurate.

"It was generally understood between Mr. Hind and myself that the comparison of tables should extend from the introduction of the altazimuth in 1847 to the latest convenient year. I need not say that I wait with intense anxiety the results of the comparison for other years.

"*Royal Observatory, Greenwich, April* 29, 1859."

On the Cause of Irregularity in the Rate of a Chronometer.
By A. Wackerbarth, Esq.

"A cause of faulty performance in a chronometer has lately been made evident to me, which it had never previously occurred to me to think of; and, as it is possible it may have escaped the observation of others also, I think it may perhaps be worth while to trouble the Society with a notice of it. Some years ago I purchased a gold pocket chronometer; it had been originally made by the elder Frodsham, and was put in order for me by the present Mr. Frodsham, who, however,

1859MNRAS..19..222W

stated that to go quite satisfactorily it would require some further repairs, but it would be well to try it first. The performance was, however, very unsatisfactory, and Mr. Frodsham thought that repairs to the amount of about 15*l.* would be necessary in order to get it to keep time satisfactorily. Söderburg, of Stockholm, made a higher estimate for repairs. Not being able to afford conveniently to repair the chronometer, it lay unemployed in its box till a watchmaker in this town, named Sedström, called on me and asked to see it. On looking at it, he told me that the instrument was to all appearance very beautifully made; that he thought there was not very much the matter with it, and asked whether he might take it home and look at it; adding that he had made three chronometers in his lifetime, of which no complaint had been made. I consented, and in a few days he called on me again, stating that he had discovered sufficient to account for considerable irregularity of rate; for, on taking out the balance-wheel, which, as usual, was loaded with steel screws, he laid it down upon his working board just where there happened at the moment to be some very fine steel filings, and observed that the steel-dust immediately jumped up and placed itself upon the screws, thus indicating that they had become magnetic, and strongly so; and this, of course, was a sufficient cause of perturbation. He offered to put in new screws, exactly weighed, and remedy some few other slight effects of wear-and-tear, and said that the whole would be but a trifling expense. He accordingly had the chronometer during the summer and autumn, while I was at the sea-side; and I have now had it home some two or three months, and it now appears to keep its rate pretty steadily, and the whole expense was no more than thirty rix-dollars (= 33*s.* 4*d.* English money). I have thought this worth mentioning, for it may occasionally happen that one goes to heavy expense upon a chronometer when there is really nothing more the matter with it than there was in this instance, when all was set to rights for not very many shillings.

"*Uppsala, March 20th,* 1859."

The Astronomer Royal, while expressing his entire confidence in the carefulness and accuracy of Mr. Wackerbarth as an observer, remarked that the circumstance to which that gentleman's communication referred had not previously escaped attention. It has been found that, with very rare exceptions, the effect of the earth's magnetism, which is much greater than that produced by local attraction, is wholly insensible.

1859MNRAS..19..224B

In a letter from Mr. Bond to Mr. Carrington, dated April 4, there occur the following notes and remarks:—

"We obtained a photograph of the comet (Donati's) on September 28th. On October 5th it was visible in the day-time.

"In the list of comets at page 155 of the Annual Report of your Council, the one discovered by Mr. H. P. Tuttle at this observatory on September 5, 1858, has been omitted;* and on page 142 it should have been stated that the same comet-hunter found Donati's independently on June 28, the day before Parkhurst.

"A nebula, which is to be found neither in Sir J. Herschel's Catalogue nor D'Arrest's, was detected by Mr. Tuttle on the 5th of February in R.A. $3^h\,21^m$, Decl. + 30° 55′. It follows a star of the 9·10 mag. by 6 seconds, and is 2′ north of it. It is barely visible in a telescope of 3 inches aperture."

After the conclusion of the reading of the papers presented to the Society, the President requested that the Astronomer Royal would occupy the chair for a short time while he offered to the meeting, according to preceding announcement, some remarks on Donati's comet in connexion with the theories that had been devised to account for the physical peculiarities of such bodies, and with especial reference to Bessel's theory of opposite polarities.

He produced diagrams of some of the most celebrated comets, such as those of 1744, 1769, 1811, 1835 (Halley's), and 1858 (Donati's), and showed that the appearances which they exhibited when approaching their perihelion were so similar that generally, in any attempt to form an adequate theory for the phenomena exhibited, any one of them might be taken, but that the excellent drawings and elaborate descriptions of Donati's comet rendered it a much more interesting subject of study than any which preceded it. The phenomena consist chiefly of the disturbance of the surface of the nucleus, and the violent emission of jets of luminous matter in the direction of the sun, followed by the rapid turning round of these jets in the opposite direction to form the tail, and afterwards of the formation of a succession of luminous envelopes, which are evidently the result of a more general and quietly-developed emission from that portion of the whole surface of the nucleus which is turned towards the sun.

He then gave a short account of the theory first propounded

---

* For an account of the discovery of this comet, and a statement of the elements of its orbit, see *Monthly Notices*, vol. xviii. p. 303.—Ed.